

## CASE REPORT

### Management of Chronic Osteomyelitis of Femur with Interlocking Intramedullary Nail in a Young Man: A Case Report

MHM Alamgir<sup>1</sup>, MM Islam<sup>2</sup>, MN Islam<sup>3</sup>, MF Hasan<sup>4</sup>, E Chowdhury<sup>5</sup>

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#### Abstract

Chronic osteomyelitis is relatively unusual complication of intramedullary nail fixation of long bone fractures. Depending on the extent of infection, timing of diagnosis and progress of fracture healing, different treatment options have been developed. There is no hard and fast rule for the treatment of chronic osteomyelitis related to implant. Still now it is a big challenge for orthopaedic surgeons to handle such cases. Some options are very costly and time consuming. We are reporting here such a case of chronic osteomyelitis of femur fracture fixed with interlocking nail in a 23 year young man. His fracture was a closed one. Appropriate therapy for chronic osteomyelitis complicating a fracture is based on a multimodality approach even if there is no set algorithm to take in charge the two central problems related to it namely eradication of infection and fracture union. The surgical techniques and choice of fracture fixation determined according to age, weight, profession, intellectual status of patient and the expertise available. Clinical signs and investigation should alert the surgeon to the possibility of an underlying infection and appropriate measures should take quickly. It is important not to underestimate local skin irritation or signs of inflammation.

**Key words:** femur, fracture ,interlocking nail ,infection, external fixator, Ilizarov

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#### Introduction

Long bone fractures are severe injuries commonly resulting from high energy trauma due to road traffic collisions. A substantial amount of energy is transferred to limbs leading to damage of soft tissue envelope as well as hard tissue like bone. Intramedullary nail fixation is

<sup>1</sup>Dr. MHM Alamgir, Assistant Professor, Department of Orthosurgery, Shaheed Suhrawardy Medical College, Dhaka

<sup>2</sup>Dr. Md. Monowarul Islam, Associate Professor, Department of Orthosurgery, Shaheed Suhrawardy Medical College, Dhaka

<sup>3</sup>Dr. Md. Nazrul Islam, Resident Surgeon, Department of Orthosurgery, Shaheed Suhrawardy Medical College, Dhaka

<sup>4</sup>Dr. Md. Forhadul Hasan, Assistant Registrar, Department of Orthosurgery, Shaheed Suhrawardy Medical College, Dhaka

<sup>5</sup>Dr. Esha Chowdhury, Medical Officer, Department of Orthosurgery, Shaheed Suhrawardy Medical College, Dhaka

**Correspondence:** Dr. MHM Alamgir, Assistant. Professor, Department of Orthosurgery, Shaheed Suhrawardy Medical College & Hospital, Sher-E-Bangla Nagar, Dhaka-1207, Bangladesh; **Email:** [d.malamgir@yahoo.com](mailto:d.malamgir@yahoo.com); **Cell no.:** +88018179144934

considered gold standard treatment of femoral shaft fracture (Ikem et al., 2007). The risk of developing infection following intramedullary nailing of closed long bone fracture is thought to be similar to general risk of infection after any orthopaedic procedure but this risk is substantially increased in the setting of open fracture and has been reported to 4 to 7% (Young et al., 2013). The incidence of infection following closed long bone fracture approaches 1-2% (Duan et al., 2012).

### Case Presentation

A 23 year young man admitted in orthopaedic ward at Shaheed Suhrawardy Medical College Hospital, Dhaka with the complaints of persistent pain, swelling and discharging sinus in the right thigh. The patient had closed fracture of right femoral shaft due motor cycle accident on 12 September 2012 and operated on 17 September 2012. The fracture was fixed with open interlocking intramedullary nail in a private setting clinic at district town. Before and during operation his vital parameters were normal.



Figure I: X-ray film of Fractured femure



Figure II: X-ray Film After operation

There was no history of loss of consciousness after accident. The patient gradually developed persistent pain, redness around the incision line and fever. Accordingly the patient was treated with antibiotics of different kinds without any response. In this situation the patient developed severe pain, swelling and ultimately pus started to discharge from lateral aspect of thigh. The patient was investigated thoroughly.



Figure III: After Operation



Figure IV: External View

The serial x-rays showed destruction fracture margins, a little new bone formation at vicinity of fracture and several pieces of sequestra. Antimicrobial therapy was started as per culture

and sensitivity report and was prepared for operation. Surgical toileting was done and removal of dead soft tissue was performed and hard tissues keeping the implant in situ. Wound remains open and gradually healed. But again the patient developed discharging sinus. At this time x-ray of the right thigh was done and showed linear callus approaching towards fracture line. As there was continuous discharge of pus, removal of nail and refixation of fracture with uniaxial external fixator was planned. On 13 July 2013 operation was done by maintaining length of femur and wound was remained open. Antibiotic continued accordingly. Serial x-ray of right thigh showed progressive union after 3 months. After that the patient can walk without any walking aid. The knee movement was about 40-180 degree and there was no limb length discrepancy.

## Discussion

Long bone fractures are common orthopaedic injuries and occur in the setting of severe trauma. Since its introduction by Kuntscher intramedullary nail has become choice of treatment for diaphyseal long bone fractures (Bong et al., 2007; Hiesterman et al., 2011). Intramedullary nailing is a technically demanding procedure that requires vigilance and careful planning in order to get optimal outcome. Major complications following this procedure includes infection, compartment syndrome, venous thrombosis, fat embolism syndrome, neurovascular damage and nonunion. All these complications could have a significant impact on the ultimate functional outcome of patients (Ricci et al., 2009). The incidence of infection following closed fractures of long bones is approximately 1-2% (Duan et al., 2012). This incidence is commonly higher, for Gustilo type I 5%, type II 10%, type III 15% (Henley et al., 1998; Guo et al., 2010; Littenberg et al., 1998).

Previous studies show that intramedullary nailing fixation provides a stable construct and allows fracture to heal even in presence of infection (Littenberg et al., 1998). The critical factors influencing the risk of developing infection were the complexity of fractures and not the techniques used (Vallier et al., 2011). Bachut et al (1997) concluded that there are no major advantages to nailing without reaming compared to nailing with reaming for treatment of closed long bone fractures. The meticulous clinical evaluation, detailed diagnostic work-up and a specific treatment strategy are critical factors in diagnosing the presence of infection after surgical procedure of long bone fractures (Althanasou et al., 2011). Criteria for clinical infection include an open wound with discharging sinus, fever persistent pain and local signs of inflammation. The laboratory investigations include full blood cell count, C-reactive protein, erythrocyte sedimentation rate along with imaging studies can lead to an accurate diagnosis of underlying infection (Mathews et al., 2009). The culture of the infected tissues provides the final diagnosis (Mathews et al., 2009). Kostas et al (2013) proposed an oncologic approach in order to diagnose and manage an infection begins from clinical staging and ending with removal of affected tissues. Different strategies for treatment of infected nail have been reported by several authors. Some of them involve retaining nail, thorough irrigation and soft tissues debridement followed by intravenous antibiotics (Motsitsi 2008). This method considers union of fracture as the most important factor and secondarily deals with infection. Second strategy aims to the eradication of infection as the main objective and involves removal of infected nail, debridement, antibiotics and refixation of fracture to achieve union. The main drawback of this method is that soft tissue and bone debridement can lead to sizeable defects requiring reconstruction by additional skills and expertise (Eshima et al., 1996). The methods of treatment depend on stage of infection and progress of fracture union. Infections are classified into three stages (Romano et al., 2011). The first stage is defined as bacterial cellulitis occurs in the postoperative period usually within 2-6 weeks,

2<sup>nd</sup> stage is defined between 2-9 months postoperatively and is associated with delayed wound healing, wound necrosis, or discharge from the operative site. An impaired fracture healing response might be present. Infection presents in the bone in this stage. The 3<sup>rd</sup> stage infection (late) is represented with established intramedullary osteomyelitis. The 1<sup>st</sup> stage can be successfully treated with nail retainment, debridement where necessary and specific antibiotic administration intravenously (Aderinto et al., 2008; Kakar et al., 2007). The 2<sup>nd</sup> stage infections were reported to heal successfully either with nail retainment, antibiotics and removal of nail with reaming of intramedullary canal after union of fracture (Haung et al., 1997; Nowotarski et al., 1994; Court-Brown et al., 1992) or with nail removal and new antibiotics nail placement (Vallier et al., 2011; Sekimpi et al., 2011). An alternative option could be an exchange nailing procedure with antibiotic administration although the burden of surgery is greater (Robinson et al., 1995; Rutter et al., 1994; Nowotarski and Brumback 1994). Stage III infections are better managed with debridement, exchange nailing and antibiotic administration (Kadar and Toretta 2007; Keating et al., 2000). Finally for stage III infected non-union site appears that Ilizarov method is most commonly used with good results when significant bone defects exist (Megas et al., 2010).

## Conclusion

The treatment of infection following intramedullary nailing of long bone fracture remains challenging and the surgeon has to consider the most appropriate treatment option in order to achieve the best clinical results and minimizing the risk of revision surgery. Prompt clinical examination and laboratory screening is mandatory for early diagnosis and treatment to achieve optimum clinical result.

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